

REMARKS

In the Office Action dated July 24, 2006, claims 12-24 are pending, claims 16-24 are withdrawn from consideration and claims 12-15 are rejected. Applicants request reconsideration at least for the reasons discussed hereinbelow.

Claims 12-15 are rejected under 35 U.S.C. §112, second paragraph. The aboe amendment is submitted to more particularly point out and distinctly claim the subject matter regarded as invention. The amendment further clarifies that the switching element changes the modal composition of the laser radiation between a first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of the radiation is increased. These features are disclosed in the description in the first and second paragraphs on page 4 and in the second paragraph on page 5. Thus, it is believed that this rejection is moot.

Claims 12-15 are rejected under 35 U.S.C. §103(a) over Mattes, et al. (US 5,876,767; "Mattes") in view of Borstel, et al. (US 6,512,781; "Borstel"). The examiner admits that Mattes fails to teach a beam expansion element or a switching element for changing the modal composition of the beam. Borstel is cited to provide for this deficiency.

However, Borstel fails to teach or suggest a switching element which changes the modal composition of laser radiation between the first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of radiation is increased. Borstel discloses only a laser in which switching between the Gauss mode (TEM_{00}) and the ring mode (TEM_{01}) is performed and all higher order modes of the laser beam are masked out in both cases. To the contrary, in the present invention as set forth in claim 12 differs, in the second setting not only one mode (the ring mode) is realized but additional higher order modes (additional to the Gauss mode) are realized and the overall power of the radiation is substantially increased.

It is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of Mattes and Borstel.

Claims 12-15 are rejected under 35 U.S.C. §103(a) over Smith (US 6,391,245) in view of Borstel. The examiner admits that Smith fails to teach a beam expansion element or a switching element for changing the modal composition of the beam. Borstel is cited to provide for this deficiency. However, as discussed above, Borstel fails to teach or suggest a switching element which changes the modal composition of laser radiation between the first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of radiation is increased.

Thus, it is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of Smith and Borstel.

Claims 12-15 are rejected under 35 U.S.C. §103(a) over Mattes in view of Borstel, et al. (EP 00118825.9; "Borstel EP"). The examiner admits that Mattes fails to teach a beam expansion element or a switching element for changing the modal composition of the beam. Borstel EP is cited to provide for this deficiency. However, Borstel EP corresponds and, as admitted by the examiner, is equivalent to Borstel. Borstel EP also **fails** to teach or suggest a switching element which changes the modal composition of laser radiation between the first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of radiation is increased.

Thus, it is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of Mattes and Borstel EP.

Claims 12-15 are rejected under 35 U.S.C. §103(a) over Smith in view of Borstel EP. The examiner admits that Smith fails to teach a beam expansion element or a switching element for changing the modal composition of the beam. Borstel EP is cited to provide for this deficiency. However, as discussed above, Borstel EP also **fails** to teach or suggest a switching element which changes the modal composition of laser radiation between the first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of radiation is increased.

Thus, it is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of Smith and Borstel EP.

Claims 12-15 are rejected under 35 U.S.C. §103(a) over Hirano, et al. (EP 0406513 A1; "Hirano") in view of Borstel EP. The examiner admits that Hirano **fails** to teach a switching element for changing the modal composition of the beam. Again, Borstel EP is cited to make up for this deficiency. As discussed above, Borstel EP **fails** to teach or suggest a switching element which changes the modal composition of laser radiation between the first setting, in which the fundamental Gauss mode is emitted and higher order modes are suppressed, and a second setting, in which the radiation contains additional higher order modes and the overall power of radiation is increased.

Thus, it is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of Hirano and Borstel EP.

Further, it is an objective of the present invention to provide a device for the layer-by-layer manufacture of a three-dimensional object which allows both, high dimensional accuracy and reduced hardening time. Applicants have discovered that this objective can be achieved by the device with a switching element as set forth in claim 12. In a first mode, a fundamental Gauss mode is emitted and higher order modes are suppressed. Thus, a focal point diameter is small and the accuracy is high (cf. first paragraph on page

4). In a second setting, the radiation contains additional higher order modes and the overall power of the radiation is increased. Surprisingly, due to the presence of additional higher order modes, the overall power is increased to such an extent that the achieved beam with a larger focal point diameter can be advanced more rapidly and the hardening time is reduced significantly (cf. second paragraph on page 5). Thus, due to the switching element changing the modal composition in this way, high resolution and high manufacturing speed can be achieved simultaneously.

None of Mattes, Smith and Hirano discloses changing modal compositions of laser radiation at all. Further, Borstel only teaches changing between two settings in each of which the higher-order modes of the laser beam are masked out such that only the Gauss mode or only the ring mode is realized. According to Borstel, in the ring mode all higher order modes are suppressed. Therefore, the emitted overall power of the radiation in this mode is not increased as in present invention wherein, in the second setting, the radiation contains additional higher order modes.

None of the cited prior art documents gives provides even a hint of a suggestion for a switching element which changes the modal composition such that, in a first setting, a fundamental Gauss mode is emitted with higher order modes suppressed and, in a second setting, the radiation contains additional higher order modes such that the overall power of the radiation is increased. Thus, none of the cited prior art documents gives any hint for the present invention and the surprising results obtained thereby.

Therefore, it is respectfully submitted that the presently claimed invention would not have been obvious to one of ordinary skill in the art in view of any combination of the cited art.

In view of the discussion above, it is respectfully submitted that the present application is in condition for allowance. An early reconsideration and notice of allowance are earnestly solicited.

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Respectfully submitted,

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